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Childcare policies, educational achievements, and health outcomes - Four essays

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Einleitung

Die bessere Vereinbarkeit von Familie und Beruf ist Gegenstand intensiver politischer und öffentlicher Diskussionen. Ein Eckpfeiler in den Bemühungen zur Verbesserung der Situation ist der Ausbau der frühkindlichen Bildung und Betreuung. Zugleich betonen Wissenschaftler und politische Entscheidungsträger die Bedeutung der Kindertagesbetreuung in der Förderung der kindlichen Entwicklung. Infolgedessen wurde der vorschulische Bildungs- und Betreuungssektor sowohl national als auch international erheblich ausgebaut. So gaben in Deutschland Bund, Länder und Gemeinden im Jahr 2019 36,9 Milliarden Euro für Kindertagesbetreuung aus, was einer Verdopplung der Ausgaben seit 2009 entspricht (Destatis, 2021; BMAS, 2020).

Gleichwohl gilt es vor dem Hintergrund der Ressourcenknappheit zu eruieren, inwiefern besagte öffentliche Investitionen aus volkswirtschaftlicher Sicht lohnenswert sind. Einerseits deuten Erkenntnisse aus der empirischen Forschung darauf hin, dass eine öffentlich finanzierte Betreuung die Entwicklung der Kinder begünstigt und zu einer Egalisierung der Entwicklungschancen beitragen kann (Melhuish et al., 2015; Esping-Andersen et al., 2002; Andreoli, Havnes & Lefranc, 2018). Andererseits wird in der Literatur bisweilen bemängelt, dass öffentliche Betreuungsleistungen ineffizient in der Bereitstellung sind, nur geringfügige Vorteile bringen und private Angebote aus dem Markt drängen (Burger, 2010). Des Weiteren weisen mehrere Studien adverse Effekte auf kognitive und nicht-kognitive Fähigkeiten nach (Fort, Ichino & Zanella, 2020; Baker, Gruber & Milligan, 2008; 2019; Herbst, 2013). Insofern besteht ein signifikanter Forschungsbedarf hinsichtlich des kausalen Zusammenhangs zwischen der formellen Betreuung und der kindlichen Entwicklung.¹

Die vorliegende Dissertationsschrift setzt hier an, indem im ersten Kapitel zunächst der

¹ Andere Teile der Literatur evaluieren die Wirkung auf die Erwerbstätigkeit der Mutter oder die Fertilität. Allerdings wird in dieser Dissertation von einer Darstellung besagter Zusammenhänge abgesehen.

bisherige Forschungsstand herausgearbeitet wird.² Auf Basis dieser Erkenntnisse werden Forschungslücken identifiziert und offene Forschungsfragen abgeleitet, welche in den Kapiteln 2, 3 und 4 empirisch untersucht werden. Die Dissertationsschrift endet anschließend mit einem kurzen Resümee.

² Der Hauptteil der Arbeit ist auf Englisch verfasst, um die Ergebnisse einem breiteren Publikum zugänglich zu machen. Lediglich Einleitung und Fazit der Dissertation sind auf Deutsch verfasst.

Kapitel 1

Empirical evidence of childcare policies - Literature review

1.1 Introduction

The past 30 years have seen a substantial increase in enrollment rates in childcare¹ programs (OECD, 2015). Specifically, on average across the OECD, 34% of all one-year-old children and 46% of all two-year-old children were enrolled in formal care programs in 2017. Across OECD countries, 88% of all infants aged 3–5 attended childcare in 2017, with enrollment rates highest in countries that are members of both the EU and the OECD (OECD, 2019). Most European countries have expanded childcare by implementing universal programs. Thus, these countries provide highly subsidized formal care (in some cases even without charging fees) to all children, irrespective of their socioeconomic background. In contrast, there is no nationwide universal program to date in the US (van Huizen & Plantenga, 2018).² Instead, private care plays a vital role here (Cascio, 2015). The country has also implemented several targeted interventions (e.g., the Head Start program). These interventions are means-tested programs that only serve socioeconomically disadvantaged children.³ Some states, such as Oklahoma or Georgia, have however implemented local universal programs.

¹ In this thesis, “childcare” is primarily used as a term for external care for children at the age of 3 (or above) (ISCED level 0-02), while “early childcare” is used as a term for toddlers under the age of 3 (ISCED level 0-01). Occasionally, I will also use “childcare”, “early education”, or “early learning” as synonyms for any pre-elementary school education.

² It should be acknowledged that the Obama administration sought to implement nationwide universal childcare.

³ Note, however, that targeted programs are not limited to the US.

Generally speaking, expanding public early education programs was initially justified by enhancing the dual-earner model. To be more precise, policymakers aimed at supporting families in reconciling work and the raising of children (Skopek et al., 2017). However, the literature documents only small impacts on female employment and fertility (e.g., Carta & Rizzica, 2018; Nollenberger & Rodríguez-Planas, 2015; Bauernschuster & Schlotter, 2015; Kline & Walters, 2016). In this thesis, however, I focus on the second justification, namely that formal care fosters children's development.

Formal care programs can promote children's development via two mechanisms. First, if an intervention improves parental labor market outcomes, the rise in household income may favor infants' skill formation. Second, and more importantly, education-oriented activities in childcare can directly foster infants' development. Heckman (2006) and Cunha & Heckman (2007; 2008; 2009) argue that early inputs are strong predictors of later adult outcomes. This hypothesis can be explained with several arguments. First, children learn during the period of early education at a faster rate than at later ages (Shuey & Kankaraš, 2018). For instance, young infants are fastest at acquiring language skills since the development of the brain areas that govern language (angular gyrus and Broca's area) peak around age 1 (Thompson & Nelson, 2001). Second, attending early education improves basic skills, such as recognizing numbers, which are necessary for developing more complex skills at later ages (Cunha & Heckman, 2008). Third, given that skills are complementary, gains in one skill dimension foster formation in other domains (Cunha & Heckman, 2007; 2008). For instance, improvements in language skills enable infants to understand tasks or ask for help (Shuey & Kankaraš, 2018). Fourth, Cunha & Heckman (2007; 2008; 2009) highlight the dynamic complementarity of skill formation, which suggests that gains in one skill dimension are highly conducive to developing more advanced competencies in the same skill dimension. However, most early education programs, particularly those in Europe, were historically implemented as programs that focus on care rather than educational activities. However, given that educationally oriented curricula emerged in the last ten to 30 years, the line between center-based childcare and preschool became blurred (Skopek et al., 2017).⁴

Researchers and policymakers have put early education center-stage to reduce social disparities in educational achievements. For instance, Esping-Andersen et al. (2002) conclude that public policies should enhance access to high-quality childcare to promote

⁴ To ease understanding, I will use the terms "childcare" and "preschool" interchangeably.

equality of opportunities. Generally speaking, parenting skills (e.g., providing emotional support; Hart, Newell & Olsen, 2003) and investments in children (monetary and nonmonetary) are the crucial components in developing children's abilities (Elango et al., 2016). However, financial constraints may impair low-socioeconomic status (SES) parents' capabilities in investing in a child. Hence, it is fair to assume that disadvantaged children might obtain the greatest benefits from childcare since the counterfactual situation might be significantly less enriching in comparison to that of their more affluent peers. This however is contradicted by the argument that even when parents experience financial constraints, they still can compensate for this through their attachment, affection, and nonmonetary investments (Elango et al., 2016). In support of this argument, Watkins & Howard (2015) document that the home environment is a strong predictor of disadvantaged children's educational achievements.

This chapter of this doctoral thesis summarizes and discusses the effects of early education programs on children's development. To do so, I will synthesize the national and international literature on the consequences for children's outcomes from childhood to adulthood. More concretely, I will examine the following outcome dimensions: cognitive test scores,⁵ educational achievements (e.g., having no grade retention), social development (e.g., the ability to express feelings), behavior (e.g., presence of antisocial behavior), educational attainment (e.g., graduating from school), labor market outcomes, criminal behavior, and health outcomes. In doing so, I will focus on works that investigate experimental and quasi-experimental settings since there is strong evidence (e.g., Loeb et al., 2007; Herbst, 2013; Dumas & Lefranc, 2012) that covariate-adjusted correlations fail to address endogeneity. Next, to ease interpretation and comparability of results, I only include programs that were conducted in Europe or North America. Relevant studies were identified in research portals (e.g., sciencedirect.com), search engines (e.g., scholar.google.de), and peer-reviewed literature surveys.

Given that the theoretical considerations in Heckman (2006) and Cunha & Heckman (2007; 2008; 2009) suggest that starting formal care at an earlier age yields higher benefits, I will discuss the effects of childcare (ages 3–6) and early childcare (ages 0–2) separately. However, distinguishing between the two types is not straightforward since some countries do not have two separate programs. For instance, Sierens et al. (2020) investigate

⁵ Some scores assess the overall skills, such as the IQ, whereas others focus on specific domains, such as literacy test scores. For the sake of brevity of this chapter, I will not discuss any scores or their validity. However, I acknowledge that the outcome variable can affect the impact of childcare.

the impact of a formal care program in Flanders, Belgium, which provides care services to children between the ages of 2 and 6. Nevertheless, in order to compare the results between the two program types, I will use the earliest possible starting age as a defining criterion. For instance, I categorize the Flemish program as an early childcare intervention due to its starting age of 2 years. Also, I will compare the evidence obtained from universal programs with those from targeted interventions. Comparing these two program types may reveal crucial insights about the transmission channels and about how to alter social policies to maximize welfare. Following the aforementioned theoretical considerations, it is a priori fair to expect that targeted interventions yield more favorable results than universal programs since all children shift from a less stimulating environment to an education-oriented program of high quality. In other words, the effects of universal programs may be smaller since the population is more heterogeneous. Hence, Skopek et al. (2017) emphasize the importance of conducting subgroup analyses when investigating universal childcare programs since they may produce substantial benefits for specific children, such as disadvantaged infants, but may not affect the remaining subgroups. To mitigate this issue, I will also explore the heterogeneity of results. Apart from the socioeconomic status, I focus on examining whether the results differ across gender. Given that girls and boys differ in some points (e.g., pre-intervention skills or interactions with caregivers) (Eriksson et al., 2012), and given that males and females outperform each other in different skill dimensions (Magnuson et al., 2016), it is also necessary to explore effect heterogeneity across gender.

The remainder of this chapter is structured as follows. Section 1.2 synthesizes the evidence on childcare programs for infants aged 3–6. Next, Section 1.3 reviews the impact of early childcare programs for toddlers at ages 0–2. Section 1.4 summarizes all findings and additionally provides a comprehensive discussion of effects and transmission channels. Finally, Section 1.5 concludes and presents open research questions.

1.2 Evidence for childcare

This section organizes and summarizes the evidence obtained from childcare programs for children aged 3–6. The first subsection reviews the literature on targeted interventions, and the second subsection synthesizes the findings from universal programs. For both types, I will first summarize the short-term effect (i.e., the impact on outcomes before entering primary school), before turning to medium-term (i.e., the consequences on

educational achievements during primary school) and long-term effects (i.e., the impact during adulthood).

1.2.1 Targeted programs

To begin with, I start summarizing evidence obtained from targeted programs from the US. Specifically, I focus on the following interventions: the Perry Preschool Project (PPP), the Head Start program (HS), and the Child Care and Development Fund (CCDF).⁶

The PPP was conducted between 1962 and 1967 in Ypsilanti, Michigan, and is one of the most-known childcare interventions. Five cohorts of 123 children attended the program and were assigned randomly to one of the experimental groups. More precisely, 58 children were assigned to the treatment group and 65 to the control group (Anderson, 2008). They started attending the PPP at age 3, received childcare for up to two years, and were followed through age 55. Although the program is considered a means-tested intervention, it did not impose a strict income threshold, but used other criteria, such as being a single parent. Furthermore, the program was designed to serve exclusively African American families (Elango et al., 2016). Perry Preschool is also considered a high-quality program that follows a researcher-designed curriculum which focuses on fostering language skills, competencies in numeracy, socio-emotional development, and other noncognitive skills (Schweinhart et al., 2005). To achieve this, the level of education of caregivers was high, while the child–staff ratio was low. More concretely, the latter ranged between 5:1 and 6:1 (Elango et al., 2016). Besides center-based care, families received additional benefits, such as parenting training or home visiting (Schweinhart et al., 2005). Families in the control group had no substitute for the PPP and mainly provided care themselves (Elango et al., 2016).

Anderson (2008) and Elango et al. (2016) examine the program’s impact on short-term and medium-term outcomes. To do so, they compare whether the mean of each outcome variable differs significantly between the treatment group and the control group.⁷ Elango et al. (2016) find that attending the PPP enhances the IQ of the average five-year-old child by 11.42 points (approximately 0.76 of a SD). At the age of 8, however, they only

⁶ Although other programs exist (e.g., the Early Training Project), I focus on the above-mentioned three programs due to the amount of available literature.

⁷ Given that the participants were randomly assigned to the groups, estimating the treatment effect is straightforward.

obtain a small and weakly significant effect (Elango et al., 2016). Anderson (2008) confirms these findings and documents that the impact remains statistically insignificant at later ages (Anderson, 2008). Examining disaggregated results indicates that the enhancement in IQ varies across gender. Anderson (2008) reveals that the effect persists for boys through 5 years of age but dissipates for girls. Next, there is evidence that the PPP enhances achievement test scores⁸ at ages 5–10, but the reported gains are concentrated among boys (Elango et al., 2016). When exploring educational achievements at ages 12 and 17, Schweinhart et al. (2005) illustrate that the PPP produces benefits in grade retention for the average child.

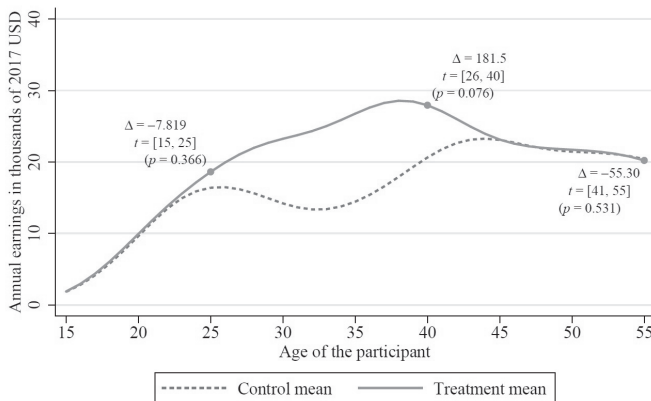
Next, I will turn to the long-term impact of the PPP at ages 27 and 40. Schweinhart et al. (2005) find that the participants reported higher earnings, less welfare dependency, and more sizable high school graduation rates (77% vs. 60%). Furthermore, the PPP plays a statistically significant role in reducing delinquency and improving health outcomes, particularly drug consumption (Schweinhart et al., 2005). Anderson (2008) confirms these findings, but disaggregated results in his work reveal sizable effect heterogeneity across gender. Specifically, females obtained higher benefits in long-term outcomes than males. For instance, when examining high school graduation at the age of 18, Anderson (2008) documents a highly significant favorable effect for females, whereas males' estimates remain statistically insignificant. In the same vein, while the intervention enhances females' employment status, it generates a zero effect for males. In contrast, however, the PPP has a favorable effect on males' monthly income and drug consumption, whereas the females' coefficients are not statistically different from 0. Surprisingly, the PPP has no consequences for college enrollment rates, neither for men nor for women (Anderson, 2008). Thus, it is most likely that the previously mentioned enhancements in labor market outcomes are moderated through the increase in high school graduation rates. Finally, Anderson (2008) addresses potential issues due to multiple inference⁹ by examining the effect on a summary index of adult outcomes. The author finds that PPP has a beneficial impact on females' long-term outcomes but does not alter those of males. Heckman & Karapakula (2019) provide the most recent evidence and examine the effects at age 55, finding several sizable benefits of attending the PPP. For instance, the participants of the treatment group have a lower number of convictions. Although point

⁸ Achievement tests assess the general age-specific development of children (Heckman, Humphries & Kautz, 2014).

⁹ The more outcomes are investigated, the larger the likelihood that a statistically significant coefficient may emerge, even when there is no causal effect.

estimates are statistically significant for both genders, the reduction is higher among males. For health outcomes, the authors report lower cholesterol levels and arterial inflammation incidence for males, while women experience reductions in cortisol level (stress hormones), diabetes incidence, and illicit-drug consumption. However, when examining the cumulative earnings between ages 15 and 55, the treatment effect is not statistically significant, even though the previous literature has reported the opposite finding. Heckman & Karapakula (2019) explain this difference by illustrating that the treatment and control group only differ in average earnings at ages 25–40 but not in other periods (see Figure 1.1)¹⁰ (Heckman & Karapakula, 2019).

ABBILDUNG 1.1: Earnings over the life course



Source: Heckman & Karapakula (2019)

Having presented the empirical evidence on the Perry Preschool Project, I turn to the Head Start program. Head Start was launched in 1965 for three- and four-year-old infants from low-income households (Hotz & Wiswall, 2019). It is the largest compensatory childcare intervention of the US federal government to this day (Duncan & Magnuson, 2013). Head Start is means-tested and only serves families whose income is at or below the poverty line. Depending on the age of enrollment, the children attend one or two years of center-based care (Elango et al., 2016). In addition, families receive medical services, home visiting, and parenting support (Deming, 2009). In 2017, the federal

¹⁰ Note that the graph is limited to males' earnings. However, the pattern is similar for women.

government provided 9 billion USD of funding to Head Start (Hotz & Wiswall, 2019). Although HS is often considered a high-quality program (e.g., Puma et al., 2010), there is substantial heterogeneity in the quality of facilities (Elango et al., 2016). This heterogeneity can be explained by the fact that HS only mandates minimum quality levels. Nonetheless, some quality measures match the standards of the Perry Preschool Project. For instance, the child–staff ratio of 7:1 (for groups at age 3) is only slightly higher than in the PPP (5:1 to 6:1) (Elango et al., 2016; Puma et al., 2010).

Deming (2009) uses survey data to investigate the short-term impact of Head Start. The author uses a sibling approach that compares children who attended HS with their older siblings who did not attend the program to address endogeneity. Hence, the author assumes that selection into HS among siblings is uncorrelated with the outcomes (Deming, 2009). However, this is quite a strong assumption, given that parents might, for instance, prefer to enroll more gifted infants. Notwithstanding this, Deming (2009) assesses the short- and medium-term impact on cognitive test scores and grade retention during primary school. Accordingly, attending Head Start has a beneficial effect on cognitive skills (0.145 of a SD) at ages 5 and 6. This effect persists through the ages of seven to ten (0.133 of a SD) but vanishes subsequently. Furthermore, Deming (2009) obtains a favorable impact on grade retention, although the effect is only weakly significant (Deming, 2009). To sum up, it is fair to conclude that HS produced moderate gains. However, given that endogeneity might be an issue, this finding should not be overemphasized.

Puma et al. (2010) apply a more robust approach, using data from the Head Start Impact Study (HSIS), which is a randomized experiment designed to evaluate the HS program. Nearly 5,000 children were randomly assigned to one of two experiment groups. Infants in the control group could not attend an HS center, although they could participate in other childcare programs. The participants of the treatment group were split into two entry cohorts. While the first cohort (entry at age 3) received two years of treatment, the latter (admission at age 4) was only eligible for one year of childcare. Initially, I summarize the effects assessed before school entry. Puma et al. (2010) report favorable consequences on short-term cognitive outcomes for both cohorts. More precisely, they document beneficial impacts on cognitive skills in the first year of treatment, primarily in literacy¹¹ and language skills.¹² The magnitude of these effects varies between 0.1 and 0.35 of a SD. However, almost all effects wane before school entry. When looking

¹¹ For instance: naming of a letter or letter–word identification.

¹² For instance: vocabulary or oral comprehension.